

Characterization of Brazilian soybean quality and effect of the protease CIBENZA® DP100 on broiler digestibility using a commercial soybean meal

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Urease activity (UA) and protein solubility in KOH (SOL) are the most commonly used *in vitro* quality measurements for soybean (SB) products used as feed ingredients for broilers in Brazil. The analyses of these parameters were reported to be correlated with SB processing parameters that theoretically indicate anti-nutritional factors (ANFs) deactivation such as trypsin inhibitor (TI). The objectives of the study were: 1) determine the levels of TI, UA and SOL in a total of 359 SB samples used by integrators from 4 Brazilian regions and analyzed by 2 laboratories, 2) validate whether UA and SOL are correlated with TI, and 3) evaluate a protease (CIBENZA® DP100, Novus International, Inc. (PRO)) effect on digestibility of a commercial solvent-extracted soybean meal (SBM) high in TI. Results were submitted to ANOVA and means compared by Tukey test. TI in SBM, heat-inactivated full-fat soybean (HIFFS) and full-fat-extruded soybean (FFES) varied from 1.2-5.5; 0.9-5.0 and 3.3-10.0 mg/g respectively. UA varied from 0.006-0.150 Δ pH unit and solubility from 70.6-90.8% in SBM. By region, TI was lower in the SBM used by Southern companies than Northeastern and Southeastern considering laboratory B results ($P<0.05$). As expected, raw soybean presented the highest TI followed by FFES, SBM and HIFFS ($P<0.05$) according to both laboratories. TI was poorly correlated with UA ($R^2=0.09$, $n=261$) and SOL ($R^2=0.19$, $n=70$) in SBM. The highest correlation was obtained for TI and SOL in HIFFS ($R^2=0.39$, $n=24$). In addition, a digestibility trial was conducted with 192 Cobb male broilers reared in cages. A common corn-SBM diet was fed to all chicks from d 1 to 21. Test diets (20% CP) containing 0.5% chromium oxide as digestibility marker were fed from d 22 to 28 and ileal digesta was collected on d 28. Both treatments (with or without 500 g/MT PRO, 12 replicates each) used commercial SBM with TI 4.2 mg/g (solubility 90% and urease 0.06 or 0.01 analyzed by laboratory A or B, respectively) as the unique protein source. Data were submitted to ANOVA analyses. PRO improved apparent ileal amino acid digestibility of all AAs except for Lys ($P=0.06$), His and Trp ($P>0.05$). Digestibility was increased by 5.4% for Met, 13% for Cys, 5.1% for Thr and 5.5% for Val. Digestibility coefficient of gross energy increased ($P<0.001$) from 74.3 to 79.9%. In summary, SOL and UA are inexpensive and easily analyzable to assess SB quality. However, these variables are not correlated to TI which is considered the best *in vitro* method to predict ANFs levels in SB products. Thus, additional TI analysis is advisable to determine SB quality. PRO was efficacious in ameliorating the negative TI effects of commercial SBM by improving digestibility of AA and energy.

Key words: trypsin inhibitor, urease activity, protein solubility, amino acids, energy